No. 691,511. Patented Jan. 21, 1902.

J. T. WATTS.

MECHANICAL MOVEMENT FOR CONVERTING MOTION.

(Application filed Oct. 24, 1901.)

(No Model.)

Fig. 1.

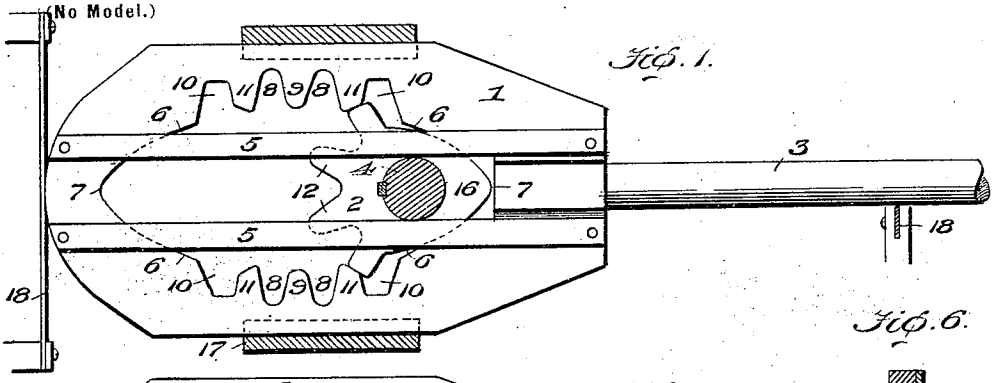


Fig. 6.

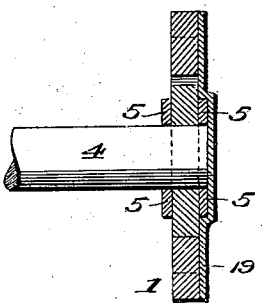


Fig. 2.

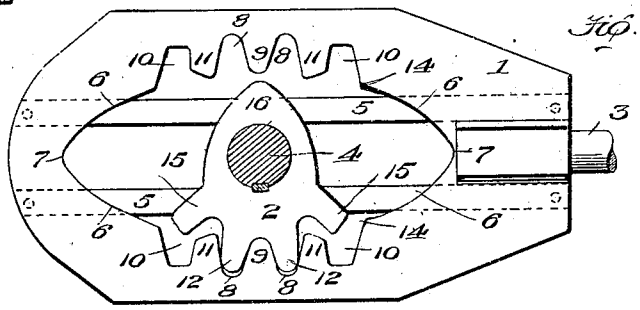


Fig. 3.

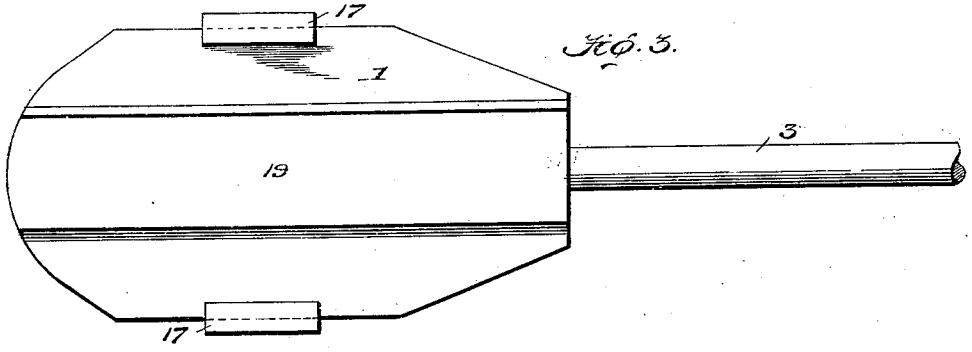


Fig. 4.

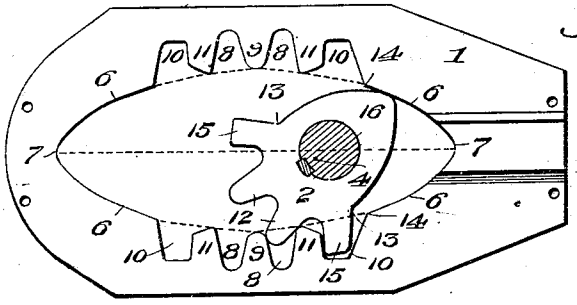
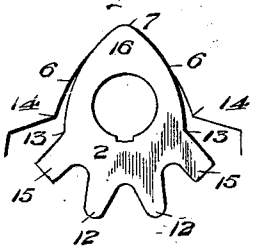


Fig. 5.



Witnesses

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MECHANICAL MOVEMENT FOR CONVERTING MOTION.

SPECIFICATION forming part of Letters Patent No. 691,511, dated January 21, 1902.

Application filed October 24, 1901. Serial No. 79,825. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. WATTS, a citizen of the United States, residing at Crookston, in the county of Polk and State of Minnesota, have invented certain new and useful Improvements in Mechanical Movements for Converting Motion, of which the following is a specification.

For converting a rotary motion into a reciprocating motion for driving machinery by a rectilinear movement is the object of my improvements and which reside in certain novel features of construction in a well-known type of mechanical movement wherein a power-driven cogged sector or cogged segment engages and continuously reciprocates an open cogged frame; and the particular matters of improvements are directed to a novel cam of elliptical shape of the uncogged part of the sector and its coöperative action upon and within a corresponding shape of the inner walls at the ends of the open toothed frame, whereby to effect a sort of cam action for gradually reducing the stroke of the frame toward its limit and for gradually starting the return stroke of the frame in its movements in relation to the cogged sector; to make provision whereby the speed of the reciprocation of the cogged frame is gradually increased toward the center of its stroke and gradually decreased from the center of the stroke, and this in both directions of the movements of the frame; to make provision whereby the speed of the reciprocating cogged frame is slowed toward the limit of its stroke in both directions as a means of lessening the impact of the cam impingement of the ends of the frame against the cam part of the cog-sector, and in means whereby the movements of the frame are rendered steady in traveling upon the cog-sector shaft and the opposite cogged sides of the frame maintained in proper working relation to the cogged sector. In these and other particulars my improvements will be particularly set out in the claims appended hereto, in connection with the accompanying drawings, in which—

Figure 1 shows in side view a device for converting motion embodying my improvements, the cogged frame being at the limit of its stroke, and illustrating the action of the uncogged cam part of the sector upon the corresponding part of the open cogged frame in the coöperative action of both in gradually reducing the speed of and starting the return movement of the cog-frame, the cog-sector being in the position it takes in leaving the one and engaging the other cogged side of the frame. Fig. 2 is a like view showing the cog-sector in engagement with the cogs mediately of the length of the frame and at which point the form of the cogs is such as to accelerate the speed of the frame, so that it will have its highest speed at this point in its movement from the middle of its length toward each end. Fig. 3 shows the covered side of the device and its fixed guides. Fig. 4 shows the cogged frame, wherein is seen the opposite cogged sides of an elliptical opening terminating in elliptical walls at each end of the opening for coöperative action with a corresponding part of the cogged sector, the latter being in the position it takes when its elliptical part is entering in contact with the corresponding walls at the end of the cog-frame. Fig. 5 is the cogged sector and the end part of the frame-opening and showing how the cogged sector is free to turn in either direction without binding against the elliptical walls at the ends of the frame-opening. Fig. 6 shows the frame in cross-section and the ways thereof for steadying its movements upon the power-driven shaft.

A plate 1, having an oblong opening the sides of which are formed with cogs to receive a cogged sector 2 for rotation within the opening, constitutes a cogged frame which engages the cogged sector and is operated thereby with a reciprocating rectilinear movement, the stroke of which is limited by the fixed position of the sector-shaft. In this movement of the frame the cogged sector is caused to engage alternately the opposite cogged sides of the frame, the driving of which thereby is caused by a rod connection 3 to operate the desired machinery. In this operation it will be understood that the primary power or motor is applied to rotate the shaft 4 of the cogged sector; but obviously the cogged frame may be made the driving power to rotate the cogged sector as the means whereby the power is transmitted to the machine desired to be operated.

Suitable fixed guides or ways 5 5 are provided on one or on both sides of the frame, confining it in its proper relation to the cogged sector.

A feature of my improvement resides in the elliptical form of the frame-opening, the walls 6 6 of which start from the cogged sides and terminate at the apex 7 of the ellipse, which apex is coincident with a line drawn through the center of the cog-sector.

The cogged sides of the open frame have a peculiar construction, and referring to Fig. 4 the dotted line will show that the ends of the acting cogs are in line with the curve of the ellipse of the frame-opening. This construction has the effect of setting the spaces 8 between the middle cogs 9 farther from the center of the opening than the terminal spaces 10 of the cogs for a purpose which I will presently state. In this figure it will also be noted as a peculiarity that the terminal cogs 11 of the frame are beveled outward at their corners standing toward the ends of the frame.

The cogged sector is peculiar in having its middle cogs 12 extending a greater distance from the center than the end cogs and having its uncogged part extended from the shaft of elliptical form, conforming to the end walls of the frame-opening at and around the point 7 of the apex of the ellipse, while at the joining of the ellipse-walls of the cogged sector with its end cogs, as at 13, Fig. 5, the distance across at these points is a little less than the distance between the joining of the ellipse-walls with the end cog-spaces at 14.

Besides the uncogged walls of the sector are of greater length from the point of the ellipse than the length of the ellipse-walls 6 of the ends of the frame-opening. This construction is to give freedom for the rotation of the elliptical extension of the sector to enter, turn within, and leave the end of the frame-opening, thereby making a gradual stop and a gradual start for the return stroke.

The elliptical form of the frame-opening gives it greater width mediately of its length, and the cogs 9 at these opposite sides of the opening are the farthest from a middle line of the opening, and the middle cogs 12 of the sector being the farthest from the center of the shaft causes the frame to have a greater speed in its movement from the middle toward each end of the opening. For this increased speed the movements of the frame are slowed toward each end, whereby the slowing is continued by the action of the walls of elliptical conformation of the ends of the frame-opening and of the cogged sector.

The purpose of beveling the end cogs 11 at each side of the frame-opening is to coöperate with the end cogs 15 of the sector to pass and engage the frame-cogs.

The uncogged part 16 of the sector projects from the shaft 4 exactly in opposition to the cogged side of the sector; but its projection is less than the cogs to allow it to rotate within the elliptical opening free of its cogged sides.

While the ways 5 5 have a sliding movement upon the rotating shaft to give steadiness to the movements of the cogged frame, fixed guides 17 support the frame and coöperate with the ways 5 in steadying the frame.

While I have provided a coöperating construction in the engaging parts of the frame and of the sector whereby the movements of the frame are gradually slowed toward each end, provision is made by springs 18, arranged to receive and to cushion the frame as it approaches the limit of its movements and in giving it a slight rebound on its return movement. In this connection it is important to note that as the frame in its reciprocation approaches the cogged sector its elliptical extension is caused to engage the walls of the elliptical ends of the frame-opening with a sliding or frictional contact, and it is this function of the rotating heel part 16 of the sector upon the rectilinear moving walls of the frame-opening that conduces largely in slowing the movements of the frame, as stated.

The frame may be provided with a cover 19 on its outer face.

I claim—

1. In a device for converting motion, the combination of a reciprocating frame having opposite cogged sides and an opening of elliptical form bounding the ends of the cogs and terminating at each end in an untoothed elliptical recess, with a revoluble cogged sector the cogs whereof are adapted to engage the opposite cogged sides, and having an elliptical projection adapted to engage the elliptical end recesses of the frame-opening for operation in the way described.

2. In a device for converting motion, the combination of a revoluble cogged sector having its intermediate cogs 12 of greater projection from the center of the sector than the end cogs and having an elliptical projection, and reciprocating frame having an elliptical opening the opposite cogged sides whereof are adapted to engage the elongated cogs of the sector, said frame-opening terminating in elliptical recesses adapted to engage the elliptical projection of the cogged sector, for operation in the way stated.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN T. WATTS.

Witnesses:
A. E. H. JOHNSON,
GUY H. JOHNSON.